

## ATTACHMENT B

### Amendments to the Claims

*This listing of claims will replace all prior versions, and listings, of claims in the application.*

1. (Currently Amended) An optical phase modulator comprising:  
a multilayer stack, comprising a plurality of dielectric layers and having a transmission function related to at least one optical property of the stack, for receiving an optical input signal to be phase modulated; and  
phase modulator means for producing a nonmechanical change in the at least one optical property of the stack to provide shifting of the transmission function to produce phase modulation of the optical input signal and to thereby produce a phase modulated output signal,  
said multilayer stack being disposed perpendicular to the optical signal to be modulated so that the signal passes serially through each dielectric layer of the plurality of dielectric layers and said dielectric layers being of at least three different thicknesses arranged in an aperiodic thickness pattern such that the phase modulator exhibits a near-linear phase modulation over a wide bandwidth.
2. (Original) A phase modulator according to claim 1 wherein said multilayer stack comprises a bandpass multilayer stack.
3. (Original) A phase modulator according to claim 1 wherein said at least optical property is refractive index, said dielectric layers each have a refractive index value, and said phase modulator means causes a variation in the refractive index of said dielectric layers such as to produce the shift in the transmission function.
4. (Original) A phase modulator according to claim 3 wherein said modulator means decreases the refractive index of said dielectric layers so as to shift the transmission function to shorter wavelengths.

5. (Original) A phase modulator according to claim 4 wherein said dielectric layers comprise GaAs and AlAs layers and said decrease is between 0% and 2.0%.
6. (Original) A phase modulator according to claim 5 wherein said decrease is about 1.3%.
7. (Original) A phase modulator according to claim 1 wherein said dielectric layers comprise both layers having a high index of refraction and layers having a low index of refraction.
8. (Original) A phase modulator according to claim 1 wherein said dielectric layers include alternating GaAs and AlAs layers.
9. (Original) A phase modulator according to claim 8 wherein layers of relatively thin layers of AlAs are inserted within selected layers of GaAs to smooth the transmission function of the stack.
10. (Original) A phase modulator according to claim 8 wherein said layers include a plurality of relatively thick layers of GaAs are interspersed at regular intervals within the stack.
11. (Original) A phase modulator according to claim 1 wherein said modulation means comprises means for optically generating free carriers to provide phase modulation of the optical input signal.
12. (Original) A phase modulator according to claim 3 wherein said modulation means comprises means for optically generating free carriers to provide phase modulation of the optical input signal.

13. (Original) A phase modulator according to claim 1 wherein said modulation means comprises means for externally injecting free carriers to provide phase modulation of the optical input signal.
14. (Original) A phase modulator according to claim 3 wherein said modulation means comprises free carrier injection means for adjusting free carrier flow through the stack so as to vary the refractive index of the layers.
15. (Original) A phase modulator according to claim 3 wherein the layers are doped with a medium exhibiting of a refractive index which varies in a nonlinear manner with optical intensity and said modulator means comprises an optical pump for generating an optical beam which, in combination with the propagating optical input signal, modulates the refractive index of the layers.
16. (Original) A phase modulator according to claim 1 wherein said dielectric layers include GaAs layers, wherein at least one quantum well is created within each GaAs layer and said modulation means comprises means for applying an electric field to the layers of said stack.
17. (Currently Amended) An optical switch comprising:  
a multilayer stack, comprising a plurality of dielectric layers and having a transmission function related to at least one optical property of the stack, for receiving an optical input signal to be phase modulated, said stack including a plurality of alternating layers of two different thicknesses and a plurality of further layers of at least one further thickness interspersed within said plurality of alternating layers; and  
optical switching means for producing a nonmechanical change in said at least one optical property of the stack to provide shifting of the transmission function to a region of high reflectivity,  
said multilayer stack being disposed perpendicular to the optical input signal to be phase modulated such that the signal passes serially through each dielectric layer of the plurality of dielectric layers.

18. (Previously Presented) An optical switch according to claim 17 wherein said at least optical property is refractive index, said dielectric layers each have a refractive index value, and said optical switching means causes an increase in the refractive index of said dielectric layers so as to produce a shift in the transmission function to longer wavelengths.

19. (Previously Presented) An optical phase modulator comprising:  
a multilayer stack, comprising a plurality of dielectric layers and having a transmission function related to at least one optical property of the stack, for receiving an optical input signal to be phase modulated; and

phase modulator means for producing a nonmechanical change in the at least one optical property of the stack to provide shifting of the transmission function to produce phase modulation of the optical input signal and to thereby produce a phase modulated output signal,

wherein said at least optical property is refractive index, said dielectric layers each have a refractive index value, and said phase modulator means causes a variation in the refractive index of said dielectric layers such as to produce the shift in the transmission function, and

wherein said modulator means decreases the refractive index of said dielectric layers so as to shift the transmission function to shorter wavelengths.

20. (Currently Amended) An optical phase modulator comprising:  
a multilayer stack, comprising a plurality of dielectric layers and having a transmission function related to at least one optical property of the stack, for receiving an optical input signal to be phase modulated; and

phase modulator means for producing a nonmechanical change in the at least one optical property of the stack to provide shifting of the transmission function to produce phase modulation of the optical input signal and to thereby produce a phase modulated output signal,

wherein said dielectric layers include alternating GaAs layers of a first thickness and alternating AIAs layers of a second thickness, and

wherein further layers of relatively thin layers of AIAs are of a different thickness from said second thickness inserted within selected layers of GaAs to smooth the transmission function of the stack.

21. (Currently Amended) An optical phase modulator comprising:

a multilayer stack, comprising a plurality of dielectric layers and having a transmission function related to at least one optical property of the stack, for receiving an optical input signal to be phase modulated; and

phase modulator means for producing a nonmechanical change in the at least one optical property of the stack to provide shifting of the transmission function to produce phase modulation of the optical input signal and to thereby produce a phase modulated output signal,

wherein said dielectric layers include alternating GaAs layers of a first thickness and alternating AIAs layers of a second thickness, and

wherein said layers further include a plurality of relatively thick layers of GaAs of a thickness greater than said first thickness interspersed at regular intervals within the stack.

22. (Currently Amended) An optical phase modulator comprising:

a multilayer stack, comprising a plurality of dielectric layers and having a transmission function related to at least one optical property of the stack, for receiving an optical input signal to be phase modulated, said dielectric layers comprising alternating layers of two different thicknesses and further interspersed layers of at least one further thickness so that said stack comprises an arrangement of said dielectric layers of thicknesses having an overall non-repeating, aperiodic pattern; and

phase modulator means for producing a nonmechanical change in the at least one optical property of the stack to provide shifting of the transmission function to produce phase modulation of the optical input signal and to thereby produce a phase modulated output signal,

wherein said at least optical property is refractive index, said dielectric layers each have a refractive index value, and said phase modulator means causes a variation in the refractive index of said dielectric layers such as to produce the shift in the transmission function,

wherein said modulation means comprises free carrier injection means for adjusting free carrier flow through the stack so as to vary the refractive index of the layers, and

wherein the layers are doped with a medium exhibiting of a refractive index which varies in a nonlinear manner with optical intensity and said phase modulator means comprises an optical pump for generating an optical beam which, in combination with the propagating optical input signal, modulates the refractive index of the layers.

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